AR 201-12875B

PHYSICAL AND CHEMICAL DATA

1. MELTING POINT

Test Substance:	Methallyl chloride, 99% purity
Method:	OECD 102
GLP:	Yes
Year:	2000
Results:	< 0 °C
Data Quality:	Code 1d
References:	FMC Corporation, Princeton, NJ

2. BOILING POINT

Test Substance:	Methallyl chloride, 99% purity
Method:	OECD 103
GLP:	Yes
Year:	2000
Results:	70 °C
Data Quality:	Code 1a
References:	FMC Corporation, Princeton, NJ

3. VAPOR PRESSURE

Test Substance:	Methallyl chloride, 99% purity
Method:	OECD 104
GLP:	Yes
Year:	2000
Results:	13.65 kPa @ 20 °C tatic method
Data Quality:	Code 1a
References:	FMC Corporation, Princeton, NJ

4. PARTITION COEFFICIENT

Test Substance:	Methallyl Chloride, 99% purity
Method:	OECD 107
Temperature:	23 °C
GLP:	Yes
Year:	2000
Results:	193 Flask-shaking method
Data Quality:	Code 1a
References:	FMC Corporation, Princeton, NJ

5. WATER SOLUBILITY

Test Substance:	Methallyl chloride
Method:	OECD 105
Temperature:	25 °C
GLP:	Yes
Year:	2000
Results:	180 mg/L
Data Quality:	Code 1a
References:	FMC Corporation, Princeton, NJ

ENVIRONMENTAL FATE AND PATHWAY

6. PHOTODEGRADATION

Test Substance:	Methallyl chloride
Method:	Estimated by the AOP program (v. 1.90) which estimates rate constants and half-lives of atmospheric reactions of organic compounds with hydroxyl radicals and ozone in the atmosphere.
GLP:	No
Year:	2000
Results:	For reaction with hydroxyl radicals, the predicted half-life is 3.2 hours with a rate constant of 3.96×10^{-13} cm^3/molecule-sec.

Data Quality:	The photodegradation calculation by an acceptable method is assigned a reliability code of 2f.
References:	AOPWIN version 1.90, Syracuse Research Corporation, Syracuse, NY

7. STABILITY IN WATER (HYDROLYSIS)

No available studies were found.

8. TRANSPORT/DISTRIBUTION (FUGACITY MODEL)

No available studies were found.

9. BIODEGRADATION

No available studies were found.

ECOTOXICOLOGY

10. ACUTE TOXICITY TO FISH

Test Substance:	Methallyl chloride, purity unknown
Method:	APHA Standard Method No. 231
Species:	Carassius auratus (fresh water)
Exposure Period:	24 hour
Type:	Static
Analytical Monitoring:	Yes
GLP: (Yes or No)	No data
Year:	1971
Results:	LC50 = 14 mg/l Temperature 20 $\pm$ 1°C, pH = 7.8, open vessels with 6 fish in each
Data Quality:	Code 4b
References:	IUCLID Data Sheet for 3-chloro-2-methylpropene, CAS No. 563-47-3, October 23, 1995 (Bridie, A.L., et al, "The acute toxicity of some petrochemicals to goldfish". Water Res. 13, 623-626, 1979)

11. ACUTE TOXICITY TO FISH

Test Substance:	Methallyl chloride, purity unknown
Method:	Bestimmung der Wirkung von Wasserinhaltsstoffen auf Fische, DIN 38412 Teil 15
Species:	Leuciscus idus (fresh water)
Exposure Period:	48 hour
Type:	Static
Analytical Monitoring:	No
GLP: (Yes or No)	No
Year:	No data
Results:	LC0 = 20 mg/l, LC50 = 22.5 mg/l, LC100 = 25 mg/l
Data Quality:	Code 4b
References:	IUCLID Data Sheet for 3-chloro-2-methylpropene, CAS No. 563-47-3, October 23, 1995 (Huels AG Marl)

12. TOXICITY TO AQUATIC PLANTS

No available studies were found.

13. ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Test Substance:	Methallyl chloride, purity unknown
Method:	Daphnien-Kurzzeittest, DIN 8412 Teil 11, Bestimmung der Wirkungvon Wasserinhaltsstoffen auf Kleinkrebse
Species:	Daphnia magna (Crustacea)
Exposure Period:	24 hour
Analytical Monitoring:	No
GLP: (Yes or No)	No
Year:	No data
Results:	EC50 = 7.2 mg/l Temperature 21°C; open vessels
Data Quality:	Code 4b
References:	IUCLID Data Sheet for 3-chloro-2-methylpropene, CAS No. 563-47-3, October 23, 1995 (Huels AG Marl)

TOXICITY

14. ACUTE TOXICITY

A. ORAL

Test Substance:	Methallyl chloride, clear liquid, 95.4% purity
Method:	40 CFR 163.81-1, United States EPA Acute Oral Toxicity Study
Species/strain:	Sprague-Dawley rats
Sex:	Male and Female
No. Animals/Group:	10/sex/dose, 4 dose levels
Post dosing observation period:	14 days
GLP: (Yes or No)	Yes
Year:	1982
Results:	The test material was administered as a 10% v/v solution in corn oil in a series of graded dose levels to groups of ten male and ten female fasted Sprague-Dawley rats. The rats were observed for signs of toxicity at 0.5, 1, 2, 3, 4 and 6 hours on the day of dosing and twice daily thereafter for thirteen days. On day 14 they were observed once. Animals dying intercurrently as well as animals surviving treatment and killed on day fourteen were necropsied.

The mortality data used to calculate the LC50 values and 95% confidence limits are summarized below:

Male: Mean Dose Level mg/kg	Dead/Tested
1639	9/10
1367	8/10
1183	7/10
1001	0/10

Female: Mean Dose Level mg/kg	Dead/Tested
1365	10/10
994	8/10
841	5/10
719	2/10

Results (continued):	The LD50 values and 95% confidence limits are shown below: Male: LD50 = 1149 mg/kg (982-1317 mg/kg) Female: LD50 = 848 mg/kg (754-942 mg/kg) The clinical signs generally observed at all dose levels included tremors, decrease locomotion, chromorhinorrhea, chromodacryorrhea, oral discharge, lacrimation, diarrhea, abdominogenital staining and ocular opacity. The rats began exhibiting signs within 30 minutes of dosing. By day 12 all surviving rats had returned to normal except for 4 incidences of ocular opacity. All deaths occurred by day 7 of the study. All surviving animals gained weight by the end of the study. Internal lesions observed at necropsy in both animals which died during the study as well as those which were sacrificed at termination included gastric hemorrhages, occult blood in the intestines and fibrous adhesions between the stomach, the liver and the diaphragm. External signs correlated with those observed previous to death. The test material is classified as slightly toxic in both male and female rats, that is, the LD50 is greater than 500 mg/kg but less than 5000 mg/kg.
Data Quality:	Code 1a
References:	"Acute oral toxicity study in rats, Methallyl chloride", FMC Toxicology Laboratory, Study Number I82-660.

B. DERMAL

Test Substance:	Methallyl chloride, clear liquid, 95.4% purity
Method:	40 CFR 163.81-2, United States EPA Acute Dermal Toxicity Study
Species/strain:	New Zealand White rabbits
No. Animals:	10
Dose:	2000 mg/kg
Vehicle:	Neat
Exposure Period:	24 hours
Post-exposure observations:	14 days
GLP: (Yes or No)	Yes
Year:	1982

Results:	Ten New Zealand White rabbits were treated with the test material at a dose level of 2000 mg/kg. The test material was introduced under a gauze pad which was itself overlayed with impervious plastic sheeting. The test material was in contact with the clipped, abraded skin of the rabbits for twenty-four hours. The animals were observed for signs of toxicity at 0.5, 1, 2, 3, 4 and 6 hours on the day of dosing and twice daily thereafter for thirteen days. On day 14 they were observed once. Body weights were recorded on 0,7 and 14 days. Animals dying intercurrently as well as animals surviving treatment and killed on day 14 were necropsied. There were three deaths. A male rabbit died on day 10, one female rabbit died on day 2 and one female rabbit died on day 4. The rabbits appeared normal on the day of dosing, however, there were some vocalization and apparent discomfort. On day one all rabbits were either ataxic or had decreased locomotion. Nasal discharge, lacrimation and unthriftiness were also observed during the study. Most rabbits returned to normal by day 5 of the study. Erythema and edema were observed on all ten test sites during the study. Blanching and eschar were later observed on the test sites of all the surviving rabbits. There was a general loss of weight during the study (average male 0.49 kg, female 0.44 kg). At necropsy, local irritation (blanching, eschar) was observed on the test sites of all the surviving rabbits. This local irritation was judged to be test material related. Nasal discharge, lacrimation, oral discharge and consolidation of the lungs were also observed at necropsy. The dermal LD50 of the test material is judged to be greater than 2000 mg/kg in both male and female rabbits.
Data Quality:	Code 1a
References:	"Acute dermal toxicity study, Methallyl chloride", FMC Toxicology Laboratory, Study Number I82-659.

C. INHALATION

Test Substance:	Methallyl chloride, clear liquid, purity undefined
Method:	Vapor
Type:	LC50
Species/strain:	Sprague-Dawley rats
Sex:	male and female
Route of Administration:	
Exposure Period:	4 hr
Doses:	5 mg/liter
GLP: (Yes or No)	No
Year:	1982
Results:	Five male and five female rats were exposed to the test compound or HEPA filtered room air (control) for 4 hr in 0.5 m^3 inhalation chambers without access to food or water. The 4 hr exposure included the time of buildup to the test atmosphere conditions but not the chamber exhaust phase. After exposure, all rats were observed twice daily for 14 days for clinical signs of toxicity and any abnormal findings were recorded. Body weights were recorded immediately before exposure (day 1) and on days 2, 3, 4, 7 and 14. All animals were necropsied on day 15. Terminal body weights were collected on day 14. Gross examination included nasal passages, trachea, bronchi, lungs and other viscera. Lungs, liver, and kidneys were collected from each rat and preserved in 10% neutral buffered formalin. No deaths occurred during exposure and no toxic signs observed during the 14 days following exposure. Body weights of exposed males and females on study day 2 were less than at pre-exposure on day 1, whereas control rats gained weight. These changes were not statistically significantly and not considered to be a significant toxicological response. There were no abnormal findings at necropsy. Male and female Sprague-Dawley rats given a single 4 hr exposure by inhalation at a nominal concentration of 6.3 mg/liter did not show any signs of toxicity through 14 days of observation.
Data Quality:	Code 2e
References:	"Acute inhalation toxicity test in Sprague-Dawley rats using methallyl chloride", Midwest Research Institute, FMC Study Number I82-661.

15. GENETIC TOXICITY IN VIVO

Test Substance:	Methallyl chloride
Method:	OECD Guideline 474
Type:	Micronucleus assay
Species/strain:	NMRI mouse
Sex:	Male and female
Route of Administration:	Gavage
Exposure Period:	Single application
Doses:	501 mg/kg (male); 631 mg/kg (female)
GLP: (Yes or No)	Yes
Year:	1983
Results:	Methallyl chloride administered at the maximum tolerable dose did not show any clastogenic activity at 24, 48 or 72 hrs post application.
Data Quality:	Code 2a
References:	IUCLID Data Sheet for 3-chloro-2-methylpropene, CAS No. 563-47-3, October 23, 1995 (Huels AG Marl Report No. MK 90/0004, 1991, unpublished)

16. GENETIC TOXICITY IN VITRO

Test Substance:	Methallyl chloride, colorless liquid, 99.5% purity
Method:	Preincubation
Type:	Salmonella/Mammalian-Microsome Preincubation Mutagenicity Assay (Ames Test)
System of Testing:	*S. typhimurium* strains TA98, TA100, TA1535, TA1537 and TA1538
Concentration:	16, 80, 400, 800 and 1000 ug with activation 5, 20, 100, 325, and 650 ug without activation
Metabolic Activation:	With and without
GLP: (Yes or No)	Yes
Year:	1984

Results:

Results of the preincubation assay were generated in two experiments. In the first experiment, the number of spontaneous revertants per plate for tester strain TA98 (with and without metabolic activation) was outside the acceptable range specified in the protocol. Therefore, TA98 was retested in a second experiment. In the first experiment, a 2.0 fold increase in TA1537 revertants per plate was observed in the presence of metabolic activation. In order to clarify this response, tester strain TA1537 was retested in the second experiment. In conclusion, methallyl chloride did not cause a positive response on any of the tester strains with or without metabolic activation by Aroclor induced rat liver microsomes, utilizing a sealed incubation chamber.

With metabolic activation: Average revertants/concentration

Strain	Solvent DMSO	16 ug	80 ug	400 ug	800 ug	1600 ug
TA98	81	90	93	78	57	15
TA100	96	101	104	109	110	87
TA1535	9	10	9	9	12	4
TA1537	4	6	8	6	7	4
TA1538	19	19	24	19	17	17

Without metabolic activation: Average revertants/concentration

Strain	Solvent DMSO	5 ug	20 ug	100 ug	325 ug	650 ug
TA98	67	68	105	72	61	22
TA100	101	94	83	100	95	92
TA1535	15	15	13	12	8	10
TA1537	6	3	3	5	5	4
TA1538	16	14	10	9	14	11

Second Experiment:

With metabolic activation

Strain	Solvent DMSO	16 ug	80 ug	400 ug	800 ug	1600 ug
TA98	27	24	27	22	24	16
TA1535	10	6	7	8	7	5

Without metabolic activation

Strain	Solvent DMSO	5 ug	20 ug	100 ug	325 ug	650 ug
TA98	14	18	17	14	15	16

Data Quality:	Code 1a
References:	"Salmonella/Mammalian-Microsome preincubation mutagenicity assay (Ames test)," Microbiological Associates, FMC Study Number A84-1329.

17. GENETIC TOXICITY IN VITRO

Test Substance:	Methallyl chloride, colorless liquid, >99 % purity
Method:	EPA New and Revised Health Effects Guidelines, Office of Pesticides and Toxic Substances, Report No. EPA 560/6-82-001, October 1983.
Type:	Sister chromatid exchange assay
System of Testing:	Chinese hamster ovary (CHO) cells
Concentration:	8, 20, 40, 60 and 80 ug/ml with activation 25, 50, 75, 125 and 250 ug/ml without activation
Metabolic Activation:	With and without
GLP: (Yes or No)	Yes
Year:	1985
Results:	Statistical analysis of the data indicates a dose-related increase in SCE/metaphase frequency at dose levels of 50, 125 and 250 ug/ml without metabolic activation. The 250 ug/ml dose level without activation approximates a two-fold increase in SCE/metaphase frequency as compared to the untreated control. There were no statistically significant increases in SCE/metaphase at any dose levels with activation. Biological significance requires a two-fold increase in SCE frequency in at least one dose level as compared to the control and/or a significant dose-response pattern. Since the data meets these criteria, the statistically positive findings are deemed biologically significant. In conclusion, methallyl chloride is considered a weak inducer of sister chromatid exchanges at the dose levels tested.

Without Metabolic Activation

Compound	Dose (ug/ml)	No. Metaphases Scored	Range of SCE/Metaphase	Total No. SCE's	Total No. Chromosomes	SCE/Chromosome
Untreated	0	50	4-12	612	1000	0.612
DMSO	1 %	50	5-16	525	1000	0.525
MAC	25	50	1-25	697	1002	0.696
MAC	50	50	5-24	714	995	0.718
MAC	75	50	6-28	688	996	0.691
MAC	125	50	7-33	851	999	0.852
MAC	250	50	10-38	1067	1000	1.067

With Metabolic Activation

Compound	Dose (ug/ml)	No. Metaphases Scored	Range of SCE/Metaphase	Total No. SCE's	Total No. Chromosomes	SCE/Chromosome
Untreated	0	50	8-24	741	1000	0.741
DMSO	1 %	50	5-32	719	996	0.722
MAC	8	50	5-22	638	999	0.639
MAC	20	50	6-30	631	992	0.636
MAC	40	50	5-22	710	999	0.711
MAC	60	50	8-27	768	1000	0.768
MAC	80	50	5-27	794	999	0.795

Data Quality: 1a

References: Pharmakon Research International Inc, FMC Study Number A85-1606.

18. REPEATED DOSE TOXICITY

Test Substance: Methallyl chloride, 90% purity

Species/strain: Fischer 344 rats

No. Animals: 8 animals/dose

Sex: Male

Dose: 75 and 150 mg/kg

Route of Administration: Gavage

Control group: Yes – corn oil

Exposure Period: 2 weeks

Frequency of Treatment: 5 days/week

Post-exposure observations: Not done

GLP: (Yes or No) No data

Year:	No data
Results:	Histopathologic examination of forestomachs from rats killed 24 hrs after the last dosing indicated that methallyl chloride in both doses caused a significant increase in the incidence and severity of mucosal cell proliferation and hyperkeratosis. The proliferative changes observed in the mucosa were more pronounced toward the proximal (esophageal) end of the forestomach with gradual dimunution in severity in more distal aspects of the forestomach.
Data Quality:	Code 3a
References:	IUCLID Data Sheet for 3-chloro-2-methylpropene, CAS No. 563-47-3, October 23, 1995 (Ghanayem, E. et al, Cancer Letters, 32:271-278, 1986).

19. REPEATED DOSE TOXICITY

Test Substance:	Methallyl chloride, 93% purity
Species/strain:	Fischer 344 rats
No. Animals:	10 animals/sex/dose
Sex:	Male and female
Dose:	50, 100, 200, 300, 400 mg/kg
Route of Administration:	Gavage
Control group:	Yes
Exposure Period:	13 weeks
Frequency of Treatment:	5 days/week
Post-exposure observations:	Not done
GLP: (Yes or No)	No data
Year:	No data

Results:	All rats that received methallyl chloride at 400 mg/kg and 5/10 males and 2/10 females that received 300 mg/kg died before the end of the studies. Final mean body weights of male rats that received 200 or 300 mg/kg were depressed 5.0% and 6.6% relative to that of the vehicle controls. Compound-related clinical signs (primarily rough coats) were observed in 5/10 females that received 300 mg/kg and in 9/10 males and 4/10 females that received 400 mg/kg. Focal areas of inflammation, which varied from acute to chronic, were observed in the livers of rats that received 300 and 400 mg/kg. The areas of necrosis were distributed throughout the liver. In the more acute lesions, the zone of necrosis was surrounded by congestion or neutrophils. The NOAEL was 100 mg/kg and LOAEL was 200 mg/kg.
Data Quality:	Code 2c
References:	IUCLID Data Sheet for 3-chloro-2-methylpropene, CAS No. 563-47-3, October 23, 1995 (National Toxicology Program Technical Report No. 300, 1986).

20. REPEATED DOSE TOXICITY

Test Substance:	Methallyl chloride, 93% purity
Species/strain:	Fischer 344 rats
No. Animals:	10 animals/dose
Sex:	Male and female
Dose:	89, 158, 281, 500, 750 mg/kg
Route of Administration:	Gavage
Control group:	Yes – concurrent vehicle
Exposure Period:	2 weeks
Frequency of Treatment:	Daily
Post-exposure observations:	Not done
GLP: (Yes or No)	No data
Year:	No data
Results:	Rats that received 500 or 750 mg/kg of the test substance died before the end of the study. Male rats that received 281 mg/kg lost weight. Animals that died during the study had dark stomachs, yellow intestines, pale and darkened areas on the liver, and/or dark fluid in the urinary bladder. The NOAEL was 158 mg/kg. The LOAEL was 281 mg/kg.

Data Quality:	Code 2c
References:	IUCLID Data Sheet for 3-chloro-2-methylpropene, CAS No. 563-47-3, October 23, 1995 (National Toxicology Program Technical Report No. 300, 1986).

21. REPEATED DOSE TOXICITY

Test Substance:	Methallyl chloride, 93% purity
Species/strain:	B6C3F1 mouse
No. Animals:	10 animals/sex/dose
Sex:	Male and female
Dose:	125, 250, 500, 750, 1250 mg/kg
Route of Administration:	Gavage
Control group:	Yes – Corn Oil
Exposure Period:	13 weeks
Frequency of Treatment:	5 days/week
Post-exposure observations:	Not done
GLP: (Yes or No)	No data
Year:	No data
Results:	All mice that received methallyl chloride at 750 or 1250 mg/kg and 9/10 males and 5/10 females in the 500 mg/kg groups died before the end of the studies. Compound-related degenerative lesions were observed in the kidney and the liver. The kidney lesions consisted of degeneration and necrosis of cortical tubules, with accumulations of cellular debris in damaged tubules. Kidney lesions varied in severity within affected dose groups. The incidence and severity were greater in males than in females. Liver lesions consisted of coagulative necrosis and/or cytoplasmic vacuolization of hepatocytes. Liver and kidney lesions often occurred in the same mice; more severe lesions were often associated with the more severe kidney lesions. Some animals had neither lesions. Mice in all groups had lung lesions consisting of interstitial inflammation, sometimes with hyperplasia of bronchiolar epithelium and epithelialization of alveolar linings. The lesions were compatible with a viral infection. Mice in these studies had antibody titers for Sendai virus, PVM or mouse hepatitis virus. The NOAEL was 125 mg/kg and the LOAEL was 250 mg/kg.

Data Quality:	Code 2c
References:	IUCLID Data Sheet for 3-chloro-2-methylpropene, CAS No. 563-47-3, October 23, 1995 (National Toxicology Program Technical Report No. 300, 1986).

22. REPRODUCTIVE TOXICITY

No available studies were found.

CRITERIA FOR RELIABILITY CODES

(Adapted from Klimisch et al 1997)

Code of Reliability	Category or reliability
1	**Reliable without restriction**
1a	GLP guideline study (OECD, EC, EPA, FDA, etc.)
1b	Comparable to guideline study
1c	Test procedure in accordance with generally accepted scientific standards and described in sufficient detail
2	**Reliable with restrictions**
2a	Guideline study without detailed documentation
2b	Guideline study with acceptable restrictions
2c	Comparable to guideline study with acceptable restrictions
2d	Test procedure in accordance with national standard methods with acceptable restrictions
2e	Study well documented, meets generally accepted scientific principles, acceptable for assessment
2f	Accepted calculation method
2g	Data from handbook or collection of data
3	**Not reliable**
3a	Documentation insufficient for assessment
3b	Significant methodological deficiencies
3c	Unsuitable test system
4	**Not assignable**
4a	Abstract
4b	Secondary literature
4c	Original reference not yet available
4d	Original reference not yet translated
4e	Documentation insufficient for assessment